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Building & Highway Material Testing Laboratory
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Job No.: CTCE/BBMP/W.No.08/PA/WMM/Gradation/2016-17 : 19.09.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

Agency : **Mr. P. Akhilesh,**
#3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.

Name of Work : Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016

Date of Testing : 19.09.2016

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **6930**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	135	135	1.9	98.1	95-100
22.4	1590	1725	24.9	75.1	60-80
11.2	1280	3005	43.4	56.6	40-60
4.75	1160	4165	60.1	39.9	25-40
2.36	995	5160	74.5	25.5	15-30
0.600	890	6050	87.3	12.7	8-22
0.075	700	6750	97.4	2.6	0-8

A&B

Note:

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Job No.: CTCE/BBMP/W.No.08/PA/WMM/AIV/2016-17 19.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
Name of the Work	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	19.09.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	81	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	301	
4	Aggregate Impact value = percent fines	21.05	21.20	
	100* (W_2/W_1)%			**21.13**

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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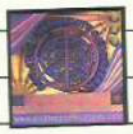
Job No.: CTCE/BBMP/W.No.08/PA/WMM/S-T/2016-17 19.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
Name of Work	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	19.09.2016



Result : Flakiness Index = **11.92%**

Elongation Index = **13.25%**

AE-8

Result : Combined Flakiness & Elongation index 25.17%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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T-2377

Job No: CTCE/BBMP/W.No.08/PA/CSR-09/150c/SDBC(QB)/2016-17 24.09.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
*AGENCY	:	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
*NAME OF THE WORK	:	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
REFERENCE	:	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	22.09.2016
PERIOD OF TESTING	:	22.09.2016 to 24.09.2016

The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

AE-8 1

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	84	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	44	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	298	Min. 220

*Information is furnished by the Customer/Representative.

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VISHWANATH C.
Quality Manager

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6/8

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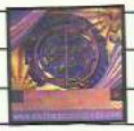
Job No.: CTCE/BBMP/W.No.08/PA/SDBC/AIV/2016-17 24.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
Name of the Work	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	24.09.2016



Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	392	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	86	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	305	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.11	22.19	22.15

AE-8

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.08/PA/SDBC/Stripping/2016-17 26.09.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
Name of the work	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	26.09.2016

AE-8
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Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.2	3.30	96.70
2	3.3		
3	3.4		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.08/PA/SDBC/Sp_Wa/2016-17 26.09.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
Name of the Work	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	26.09.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2023	2026	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1272	1273	1276	
4	Weight of saturated surface dry aggregate in air	W_3 g	2020	2021	2022	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	748	748	746	
6	Weight of oven dried aggregate	W_4 g	2008	2010	2009	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.684	2.687	2.693	2.688
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.728	2.727	2.741	2.732
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.60%	0.55%	0.65%	0.60%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.08/PA/SDBC/Bitumen/2016-17 26.09.2016

BITUMEN DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC : SP : 11 - 1984

CUSTOMER	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
NAME OF THE WORK	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
SAMPLE I/D	Roads in Bhadrappa layout Ward No.08, BBMP, Bangalore.
DATE OF TESTING	26.09.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474.5	474.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25.5	25.50
7. Bitumen content in %	5.10	5.10
8. Average	**5.10**	

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Job No.: CTCE/BBMP/W.No.08/PA/SDBC/Bitumen/2016-17 26.09.2016

GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS : 2386 and IRC : SP : 11 - 1984

CUSTOMER	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
NAME OF THE WORK	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
SAMPLE I/D	Roads in Bhadrappa layout Ward No.08, BBMP, Bangalore.
DATE OF TESTING	26.09.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	25.36	5.34	5.34	94.66	90-100
4.75	248.96	52.47	57.81	42.19	35-51
2.36	54.32	11.45	69.26	30.74	24-39
1.18	51.26	10.80	80.06	19.94	15-30
0.3	28.79	6.07	86.13	13.87	9-19
0.075	37.98	8.00	94.13	5.87	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	33.68	7.10	7.10	92.90	90-100
4.75	259.87	54.77	61.87	38.13	35-51
2.36	56.32	11.87	73.73	26.27	24-39
1.18	42.15	8.88	82.62	17.38	15-30
0.3	25.68	5.41	88.03	11.97	9-19
0.075	30.27	6.38	94.41	5.59	3-8

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Job No.: CTCE/BBMP/W.No.08/PA/SDBC/AGG/2016-17 26.09.2016

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. P. Akhilesh,** #3, Santrupthi, Vinayaka Layout (Old Venkategowda layout), Hebbal, kempapura, Bangalore – 24.
Name of the Work	Improvements and asphalting to main road of Bhadrappa layout and TATA Nagara in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/51/2016-17 Dated: 15.06.2016
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	26.09.2016

Total Weight of Sample: 5650 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	453	8.0	8.02	91.98	90-100	
4.75	2974	52.6	60.65	39.35	35-51	
2.36	783	13.9	74.51	25.49	24-39	
1.18	451	8.0	82.50	17.50	15-30	
0.3	386	6.8	89.33	10.67	9-19	
0.075	325	5.8	95.08	4.92	3-8	

AE-8

Total Weight of Sample: 5600 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	386	6.9	6.89	93.11	90-100	
4.75	2962	52.9	59.79	40.21	35-51	
2.36	629	11.2	71.02	28.98	24-39	
1.18	434	7.8	78.77	21.23	15-30	
0.3	345	6.2	84.93	15.07	9-19	
0.075	490	8.8	93.68	6.32	3-8	

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